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(54) IMPROVEMENTS IN OR RELATING TO AXIAL MODE HELICAL ANTENNAS

(71) We, THE MARCONI COMPANY LIMITED, a British company, of Marconi House, New Street, Chelmsford, Essex CM1 1PL, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to axial mode helical antennas.

An axial mode helical antenna consists of a helix arranged such that its axis extends from a ground plane and fed from its end nearer the ground plane to provide circularly polarised radiation in the axial direction.

One disadvantage of such an antenna is that the input impedance of the helix tends to be high, typically between 100 and 200 ohms, which renders it unsuitable for feeding directly by a co-axial cable whose impedance is much lower, for example, 50 ohms. Previously co-axial or strip-line impedance transformers have been used to provide the required transformation. However such transformers add very considerably to the bulk, weight and cost of the antenna.

The present invention seeks to provide an improved axial mode helical antenna which may be fed from a relatively low impedance source such as a co-axial cable, without necessarily requiring the use of a matching co-axial or strip-line transformer.

According to this invention an axial mode helical antenna is provided wierein in order to reduce the input impedance thereof an auxiliary conductive path is provided extending from the feed point of the helix to a further point part of the way around the first turn of the helix and one or more tuning stub members are provided extending from the ground plane of the antenna towards the first turn of the helix.

Normally the helix will be a cylindrical helix, but it may, be, for example, a conical helix.

Said auxiliary conductive path is preferably a strip conductor but it may, for example, take the form of a segmental plate filling in the area between a straight line drawn between the feed point and said further point and the part of the first turn of the helix between said two points.

Typically said further point is one quarter of a turn around said first turn from said feed point.

Typically three or four tuning stub members are provided.

The number and position of said tuning stub members and the length of said auxiliary conductive path (or in other words the length of helix between said two points bridged by said auxiliary conductive path) depends upon the construction of the antenna and the frequency band required and would normally be determined empirically.

The invention is illustrated in and further described with reference to the drawing accompanying the Provisional Specification in which,

Figure 1 is a plane view of one axial mode helical antenna in accordance with the present invention and

Figure 2 is a side elevation of the antenna of Figure 1.

Referring to the drawing, the antenna consists of a ground plane 1 from which extends a cylindrical radiating helix 2 whose axis 3 (which is also the direction of radiation) is perpendicular to the ground plane 1. The helix 2 is supported from the ground plane 1, by one or more insulating support members (not shown). The feed point 4 of the helix 2 is at the start of the helix adjacent the ground plane 1. The feed point 4 is connected to a co-axial plug 5. Connected between the feed point 4 of the helix 2 and a further point 6 on the first turn of the helix, is an auxiliary conductive path in the form of a link 7. The further point 6 is approximately one quarter of a turn away from the feed point 4 around the first turn of the helix.

Mounted on the ground plane 1 and extending towards the first turn of the helix are four tubing stub members reference 8, 9, 10 and 11.

The tuning stub members 8 to 11 are represented in dotted outline in Figure 1.

The length of the conductive link 7 and the position and numbers of tuning stubs 8 to 11 will depend upon the construction of the antenna and the frequency band required. Typically the link 7 will be 0.3 wavelengths long where λ is the mid-frequency of the operating band. To position the tuning studs 8 to 11 first one tuning stub is located at a position of maximum effect on the voltage standing wave ratio (VSWR) and adjusted; a second turning stud is then located at a position of maximum effect and adjusted . . . and so on until no further improvement in the match between the co-axial cable connected to plug 5 and the helix 2 can be obtained.

WHAT WE CLAIM IS:—

1. An axial mode helical antenna wherein in order to reduce the input impedance thereof an auxiliary conductive path is provided extending from the feed point of the helix to a further point part of the way around the first turn of the helix and one or more tuning stub members are provided extending from the ground plane of the antenna towards the first turn of the helix.

2. An antenna as claimed in claim 1 and wherein said helix is a cylindrical helix.

3. An antenna as claimed in claim 1 and wherein said helix is a conical helix.

4. An antenna as claimed in any of claims 1 to 3 and wherein said auxiliary conductive path is a strip conductor.

5. An antenna as claimed in any of claims 1 to 3 and wherein said auxiliary conductive path takes the form of a segmental plate filling in the area between a straight line drawn between the feed point and said further point and the part of the first turn of the helix between said two points.

6. An antenna as claimed in any of the above claims and wherein said further point is one quarter of a turn around said first turn from said feed point.

7. An antenna as claimed in any of the above claims and wherein three or four tuning stub members are provided.

8. An axial mode helical antenna substantially as herein described with reference to the drawing accompanying the Provisional Specification.

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1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

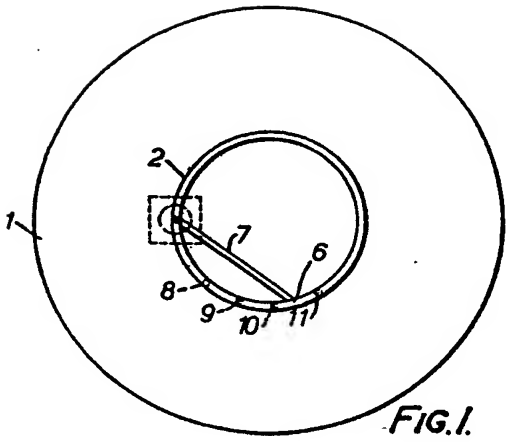

FIG. 1.

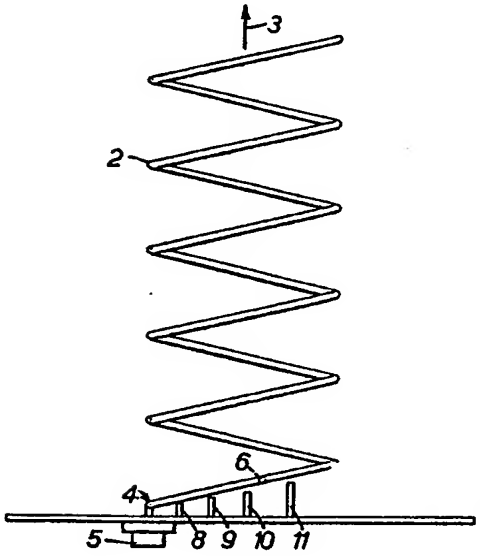

FIG. 2.